



## Dr. Maria (Masha) Okounkova

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she/her pronouns, US Citizen

### Education

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PhD in Physics	<b>California Institute of Technology (Caltech)</b>	2014 - 2019
	Advised by Prof. Saul Teukolsky Theoretical Astrophysics, Walter Burke Institute for Theoretical Physics Kip Thorne Prize <i>for Excellence in Theoretical Physics</i> John Stager Stemple Memorial Prize <i>for best performance on oral candidacy exam and research progress</i> Dominic Orr Graduate Fellowship	
	<b>Received formal pedagogy training through the Caltech Center for Teaching, Learning and Outreach (CTLO) on curriculum, assignment, and lab development, and equity and diversity in education</b>	
B.A. in Physics	<b>Princeton University, <i>magna cum laude</i></b>	2010 - 2014
	Certificate (minor) in Applications of Computing Kusaka Memorial Prize in Physics <i>for top graduating seniors in physics</i> Allen G. Shenstone Prize in Physics <i>for top juniors in physics</i>	

### Academic Positions

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Research Fellow	<b>Flatiron Institute Center for Computational Astrophysics</b>	2019 - present
	Researching black holes and gravitational waves using theoretical physics, computational physics, and data analysis Member of the Gravitational Waves Group, the Simulating eXtreme Spacetimes (SXS) collaboration (computational astrophysics), the LIGO Scientific Collaboration (gravitational wave observation and data analysis), and the LISA Scientific Consortium (next-generation gravitational wave detectors)	

### Teaching and Mentorship

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Student and Research Mentor	<b>Simons Foundation - National Society of Black Physicists Program</b>	2021 - present
	A Simons-Foundation funded undergraduate research program at the Flatiron Institute	
	Mentoring an undergraduate student in the National Society of Black Physicists in research on black hole astrophysics and physics graduate school applications.	
	Student feedback includes “Dr. Okounkova’s willingness to allow me to explore my own curiosity without disdain has benefitted the progression of my academic career to a degree I could have never imagined. Her ability to foster an environment where I felt welcomed and comfortable greatly improved my confidence in my own abilities as a researcher and opened countless opportunities for my future career. Needless to say, Dr. Okounkova’s mentoring abilities, her welcoming gentle demeanor, and her willingness to explore the edges of modern physics with aspiring academics have proven to be a priceless asset in my career.”	
Student and Research Mentor	<b>AstroCom NYC Program</b>	2020 - present
	An NSF-Funded astrophysics research program for primarily minority students in the City University of New	

York (CUNY) college system

Mentoring undergraduate students on research in black hole and gravitational wave astrophysics, physics courses, and physics graduate school. Participating in mentor education programs, including learning mentorship techniques from social workers, therapists, and diversity advocates.

Student feedback includes “Masha is without question one of the brightest, most diligent, and thoughtful mentors I have ever met. She is qualified to deal with a substantial workload, interfaces extremely well with others, is reliable, and a pleasure to have around. I have no doubt that she will excel in the teaching profession world.”

Student and Research Mentor	<b>Caltech Summer Undergraduate Research Fellowship (SURF)</b>	2016 - 2017
	An NSF-Funded research program for undergraduate students at the California Institute of Technology	
	Mentored an undergraduate student in research on black hole physics, resulting in a successful final paper and student presentation.	
Teaching Assistant	<b>California Institute of Technology (Caltech)</b>	2016 - 2017
	<b>Physics 20: Introduction to Tools of Scientific Computing</b> (including Python, Mathematica, unix tools, version control, numerical integration, numerical differentiation, and curve-fitting)	
	<b>Physics 21: Tools for Data Analysis</b> (including data parsing, Fourier methods, Bayesian analysis, image analysis, Markov Chain Monte Carlo, covariance and principal component analysis)	
	<b>Physics 22: Tools for Numerical Methods</b> (including root finding, higher order differential equation methods, N-body simulations, and tree data structures)	
	These courses were nominally led by Caltech Professor Tom Prince, but my co-TA and I effectively did all of the teaching, lab work, and assessments. Students in each course would have a weekly assignment and come to the computational physics lab for a 3-hour session, where I would teach them the material, and help them with the assignment. Students in these classes, especially Physics 20, came from a variety of computational backgrounds, and thus it was important to have a flexible, patient, and learning-outcomes focused approach.	
	I received stellar course evaluations, scoring higher than the department, division, and Caltech-wide averages, and obtaining reviews including “very helpful”, “very supportive”, “incredibly patient all the time”, “inspired me to think about problems that I had never thought about”, and “awesome”.	
Laboratory Teaching Assistant	<b>Princeton University</b>	2012 - 2014
	<b>Computer Science 109: Computers in our World</b> (course for non-STEM majors on concepts in computer science)	
	<b>Computer Science 126: Introduction to Computer Science</b> (including variables, data types, loops, conditionals, arrays, functions, sorting, searching, stacks, queues)	
	<b>Computer Science 217: Introduction to Programming Systems</b> (including linux, bash, C, version control, pointers, make, memory, modularity, assembly language)	
	<b>Computer Science 226: Algorithms and Data Structures</b> (including algorithm analysis, stacks, queues, sorting algorithms, symbol tables, search trees, hash tables, graphs, data compression)	
	Helped students with computer science course assignments, teaching them various concepts from conceptual computer science by diagramming algorithms through applied computer science by working on computer programs together.	

## Leadership and Service

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Reading Group Organizer	<b>Anti-Racist Pedagogy Reading Group</b>	2020 - present
	Organized bi-weekly reading discussions centered around increasing diversity in teaching physics and astronomy for educators in the New York City area.	

Texts read include “Teaching to Transgress” by bell hooks, “Pedagogy of the Oppressed” by Paulo Freire, “Characteristics of White Supremacy Culture” by Tema Okun, “Becoming a Critically Reflective Teacher” by Stephen D. Brookfield, and “For White Folks who Teach in the Hood ... and the Rest of Y'all Too: Reality Pedagogy and Urban Education” by Christopher Emdin.

Student-Postdoc Advocate	<b>Simulating Extreme Spacetimes Collaboration</b>	2019 - present
	Created the position of Student/Postdoc Advocate within the Simulating Extreme Spacetimes computational physics collaboration in order to provide students and postdocs with an official peer resource. Students and junior scientists can anonymously come to me with their concerns, and I work with them and the faculty members to help rectify the conflict.	
Group meeting leader	<b>California Institute of Technology (Caltech)</b>	2015 - 2019
	Led weekly computational astrophysics research group meetings, organized and taught weekly courses on computational physics to undergraduate and graduate students within the research group.	
Executive Committee Member	<b>Simulating Extreme Spacetimes Collaboration</b>	2019 - present
	Serve as a junior scientist representative on the executive committee, working to increase diversity within the collaboration through diversity education	
Journal Referee	<b>APS Physical Review D, APS Physical Review Letters, Classical and Quantum Gravity</b>	
Conference Organizer	<b>Pacific Coast Gravity Meeting (PCGM) 34, Caltech</b> <b>Caltech/JPL Association for Gravitational-Wave Research Seminar Series</b>	

## Scientific Outreach

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I regularly participate in community science events at local schools, guest lectures in high school and college courses, and astronomy outreach events including Astronomy on Tap. For an example of my public outreach talks to a general audience, please see [a lecture on computational physics](#) I gave at Caltech. For an example of my outreach talks to K-12 students, please see one of the [Ask-a-Scientist discussions](#) I led at the Flatiron Institute.

## Speaking

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### Invited talks, seminars, and workshops

1. Apr 2022, Penn State, Fundamental Theory Seminar
2. Apr 2022, Cal State Dominguez Hills, Physics Seminar
3. Mar 2022, University of Texas Rio Grande Valley, Physics Colloquium
4. Mar 2022, Oregon State University, Physics Colloquium
5. Feb 2022, Cal State Long Beach, Physics Colloquium
6. Feb 2022, UC Berkeley, Astronomy Colloquium
7. Feb 2022, UC Berkeley, Astronomy Seminar
8. Feb 2022, Cal State San Bernardino, Physics Seminar
9. Feb 2022, Georgia Institute of Technology, Physics Colloquium
10. Jan 2022, Harvey Mudd College, Physics Colloquium
11. Oct 2021, University of Cambridge, DAMTP, General Relativity Seminar
12. Sep 2021, Perimeter Institute, Strong Gravity Seminar
13. Jul 2021, Sapienza University of Rome, Gravity Theory Seminar
14. Apr 2021, Universitat de les Illes Balears, Seminar
15. Feb 2021, Caltech, Tapir Seminar
16. Dec 2020, SISSA Trieste, Gravity Seminar
17. Dec 2020, The College of New Jersey, Physics Colloquium

18. Nov 2020, Columbia University, Theory Group Seminar
19. Oct 2020, ICERM (Institute for Computational and Experimental Research in Mathematics), Brown University, Mathematical and Computational Approaches for Solving the Source- Free Einstein Field Equations Workshop
20. Sep 2020, ICERM (Institute for Computational and Experimental Research in Mathematics), Brown University, Advances and Challenges in Computational Relativity Workshop
21. Aug - Sep 2020, KITP (Kavli Institute of Theoretical Physics), UC Santa Barbara, Probing Effective Theories of Gravity in Strong Fields and Cosmology Workshop
22. Aug 2020, University of Mississippi, Special seminar
23. Jun 2020, Canadian Institute for Theoretical Astrophysics, CITA seminar
24. Jul 2020, Centro de Ciencias de Benasque, New frontiers in Strong Gravity workshop, Cancelled due to Covid-19 pandemic
25. Jun 2020, University of Rome, Strong Gravity Beyond workshop, Cancelled due to Covid-19 pandemic
26. Dec 2019, NYU, Guest lecture in general relativity course
27. Nov 2019, University of Amsterdam, Gravitational Wave Probes of Fundamental Physics workshop
28. Oct 2019, NYU Center for Cosmology and Particle Physics, Astro seminar
29. Dec 2018, Cornell University, Gravity Lunch Seminar.
30. Nov 2018, UT Austin, Physics Seminar.
31. Nov 2018, Princeton University, Princeton Gravity Initiative Lunch Seminar.
32. Sep 2018, Perimeter Institute, Strong Gravity Seminar
33. Aug 2018, Cal State Fullerton, GWPAC High Performance Computing Workshop
34. Jul 2018, Simons Summer Workshop, Frontiers in Cosmology and Numerical General Relativity
35. Jun 2018, Centro de Ciencias de Benasque, Numerical Relativity beyond General Relativity workshop
36. Apr 2018, Caltech, Theoretical astrophysics seminar
37. Jan 2018, Keck Institute for Space Sciences, The Architecture of LISA Science Analysis
38. Dec 2017, Caltech, LIGO seminar

### Speaking awards and honors

1. John Stager Stemple Memorial Prize, Caltech, *for best candidacy presentation*
2. American Physical Society (APS) Division of Gravitational Physics (DGRAV) Prize *for best talk at Pacific Coast Gravity Meeting*
3. Oculus and Amazon Prizes, Hack Music Los Angeles *for best Hackathon product and presentation*
4. Hartle Award *for best talk in numerical relativity session at GR21 conference*
5. Theoretical Astrophysics in Southern California Prize *for best conference talk*

## Scientific Publications

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1. **Maria Okounkova**, Will Farr, Maximiliano Isi, Leo C. Stein. *Constraining gravitational wave amplitude birefringence and Chern-Simons gravity with GWTC-2*. arXiv:2101.11153 Accepted to Phys. Rev. D., Jan 2021
2. **Maria Okounkova**. *Revisiting non-linearity in binary black hole mergers*. arXiv:2004.00671 Submitted to Phys. Rev. D., Apr 2020
3. **Maria Okounkova**. *Numerical relativity simulation of GW150914 in Einstein dilaton Gauss- Bonnet gravity*. Phys. Rev. D 102:084046, Oct 2020
4. **Maria Okounkova**, Leo C. Stein, Jordan Moxon, Mark A. Scheel, and Saul A. Teukolsky. *Numerical relativity simulation of GW150914 beyond general relativity*. Phys. Rev. D 101:104016, May 2020
5. Enrico Barausse et al. (inc. **Maria Okounkova**). *Prospects for Fundamental Physics with LISA*. Gen. Rel. Grav 52(8):81, Aug 2020
6. **Maria Okounkova**. *Stability of rotating black holes in Einstein dilaton Gauss-Bonnet gravity*. Phys. Rev. D 100:124054, Dec 2019
7. **Maria Okounkova**, Leo C. Stein, Mark A. Scheel, and Saul A. Teukolsky. *Numerical binary black hole collisions in dynamical Chern-Simons gravity*. Phys. Rev. D 100:104026, Nov 2019
8. Rana X. Adhikari et al. (inc. **Maria Okounkova**). *Astrophysical science metrics for next- generation gravitational-wave detectors*. Class. Quant. Grav. 36 245010, Nov 2019
9. Michael Boyle et al. (inc. **Maria Okounkova**). *The SXS Collaboration catalog of binary black hole simulations* Class. Quant. Grav., April 2019

10. **Maria Okounkova**, Mark A. Scheel, and Saul A. Teukolsky. *Evolving Metric Perturbations in dynamical Chern-Simons Gravity*. Phys. Rev. D 99:044019, Feb 2019
11. **Maria Okounkova**, Mark A. Scheel, and Saul A. Teukolsky. *Numerical black hole initial data and shadows in dynamical Chern-Simons gravity*. Class. Quant. Grav., Feb 2019
12. Swetha Bhagwat, **Maria Okounkova\***, Stefan W. Ballmer, Duncan A. Brown, Matthew Giesler, Mark A. Scheel, and Saul A. Teukolsky. *On choosing the start time of binary black hole ringdowns*. Phys. Rev. D 97:104065, May 2018. \* **lead authors alphabetical**
13. **Maria Okounkova**, Leo C. Stein, Mark A. Scheel, and Daniel A. Hemberger. *Numerical binary black hole mergers in dynamical Chern-Simons gravity: Scalar field*. Phys. Rev. D 96:044020, Aug 2017.
14. Paolo Agnes et al. (inc. **Maria Okounkova**), *First Results from the DarkSide-50 Dark Matter Experiment at Laboratori Nazionali del Gran Sasso*. Phys. Lett. B 743:456, Feb 2015.

## References

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